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Conference Abstract

Biodiversity Information Standards (TDWG): Social and Conceptual Infrastructure for Integrating Biodiversity Information

Stanley Blum‡, David Bloom§

‡ Biodiversity Information Standards (TDWG), San Francisco, United States of America
§ Biodiversity Information Standards (TDWG), Sebastapol, United States of America

Corresponding author: Stanley Blum (stanblum@gmail.com)

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Abstract

The International Working Group on Taxonomic Databases (TDWG)*[1] was established in 1985 to promote biodiversity data sharing and collaboration among organizations, projects, and people who manage biodiversity information. To achieve these goals TDWG develops standards for publishing biodiversity data and provides a forum for advancing biodiversity informatics.

TDWG provides critical elements for developing biodiversity information standards, including: an organizational structure, processes for ratifying and maintaining standards, and the collaboration tools available to participants. TDWG's role as an open standards body creates a complementary partnership with the Global Biodiversity Information Facility (GBIF).

TDWG's organizational structure is established in its Constitution and includes an Executive Committee, a suite of standing committees for on-going operational concerns, a Technical Architecture Group (TAG), and an array of interest, task and maintenance groups that develop and maintain standards. These groups and committees provide TDWG's administration, maintain existing standards and best practices, and support the

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efforts of the community to create, expand and implement data standards using current methodologies of computer and information science.

TDWG's Process prescribes how interest and task groups are established to develop standards. Interest groups typically form organically when people with a shared interest in a particular aspect of biodiversity science determine that the science can be better supported by integrating information they create and manage. An interest group is established by writing a charter that describes its purpose and scope, the way of work, and how to become involved. The group designates one or more conveners, who are then responsible for managing the group and communicating with the Executive. The conveners submit the charter to the Executive for approval, and the approved charter is posted on the TDWG website and announced via email and social media. In addition, collaboration tools, such as a GitHub repository, mailing list, and slack channel can be created to support the group's work. Interest groups explore problems and plan the development of potential solutions. When a plan has taken shape, a task group is established within the interest group by drafting its charter using a similar template and having it approved by the Executive. The essential difference between an interest and task group is that an interest group continues as long as the community's interest sustains it, whereas a task group works to a schedule and dissolves when the task is finished. Throughout the exploration and planning phases, an interest group should seek advice from the TAG on methods for developing the standard and the framework for documenting it.

The TDWG Process also specifies how a standard gets ratified. When a draft is complete the conveners submit it to the Executive, which then appoints a review manager to shepherd the draft through review. Ratification entails both expert and public review, combining the familiar practice of scientific peer review and the internet practice of open source improvement. The review manager summarizes the review outcomes and makes a recommendation to the Executive. When a consensus indicates that the standard is usable and contains no serious problems, the Executive ratifies the standard. The standard is registered and a landing page with a standard suite of metadata is posted on the TDWG website. If the standard contains terms and definitions, URL targets are created in https://rs.tdwg.org. In many cases, a website specific to the standard is established in the TDWG domain, and guides people in how to use the standard. Finally, a maintenance group is established to receive feedback and modification proposals from the community, and ensure that the standard continues to improve. Maintenance groups use a similar, but less cumbersome process, the Vocabulary Maintenance Standard (VMS), to add, change, or deprecate elements of ratified standards.

When TDWG was founded, members were focussed primarily on taxonomic compilations; basic species information, such as scientific names and synonyms, geographic distributions, and bibliographies of essential literature. During the 1990s, the number and size of primary biodiversity databases (e.g., natural history collection databases) grew exponentially, and soon it was recognized that a global data infrastructure would be needed to integrate all these data resources and support biodiversity science (Robbins 1996). GBIF was established in 2001 to meet that need,

and since then TDWG and GBIF have been engaged in a complementary informal partnership. TDWG's role in this partnership has been to establish and maintain standards for the key concepts in primary biodiversity data. GBIF's role has been to develop and maintain the technology that enables access to the world's biodiversity data as a well integrated resource. By necessity, GBIF was created through international agreement, as an organization responsive to governments, ensuring that this global data infrastructure is effective and sustained. TDWG, on the other hand, is an open standards organization that enables any member of the global community to participate in developing the data concepts required for biodiversity science.

While TDWG's basic standards have helped to integrate immense quantities of primary biodiversity data, they have also imposed limitations. For example, presence-only occurrence data supports only a limited class of methods for species distribution modeling. Our more recent efforts, however, are broadening the kinds of primary data that can be brought to bear on documenting biodiversity and its change over time. These include the Humboldt extension for surveys and monitoring, and the environmental DNA standard (eDNA) for documenting occurrences through the traces of DNA left in the environment. Finally, the Darwin Core Data Package, recently developed by GBIF and currently in review by TDWG, should enable us to mobilize more kinds of data, broaden our community, and support new advances in biodiversity science.

Keywords

data standards, standards development process, standards ratification

Presenting author

Stanley Blum

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Conflicts of interest

The authors have declared that no competing interests exist.

References

- Robbins R (1996) Bioinformatics: Essential Infrastructure for Global Biology¹. Journal of Computational Biology 3 (3): 465-478. https://doi.org/10.1089/cmb.1996.3.465

Endnotes

*1 The organization changed its name to Biodiversity Information Standards (TDWG) in 2007 to better reflect its purpose and expanded scope. The "TDWG" abbreviation was kept to preserve continuity and connection to the internet domain name.